TITLE:
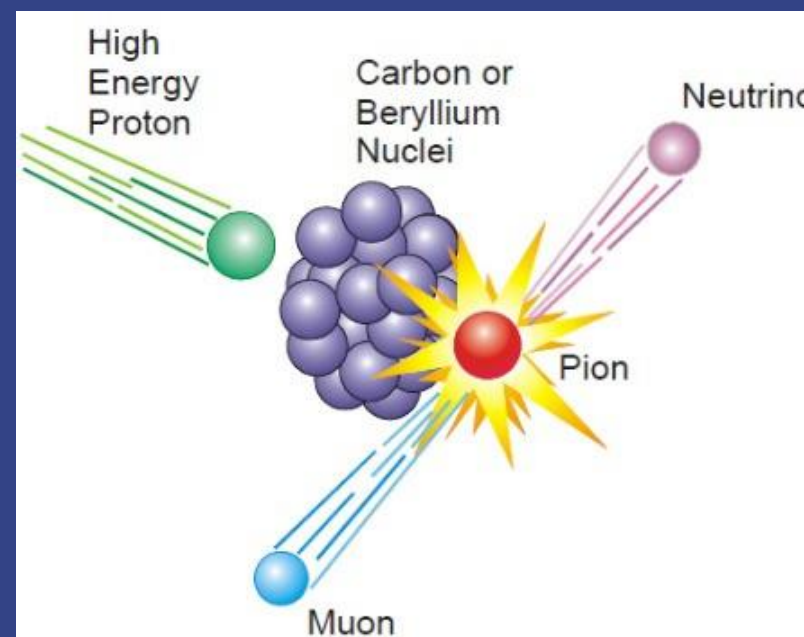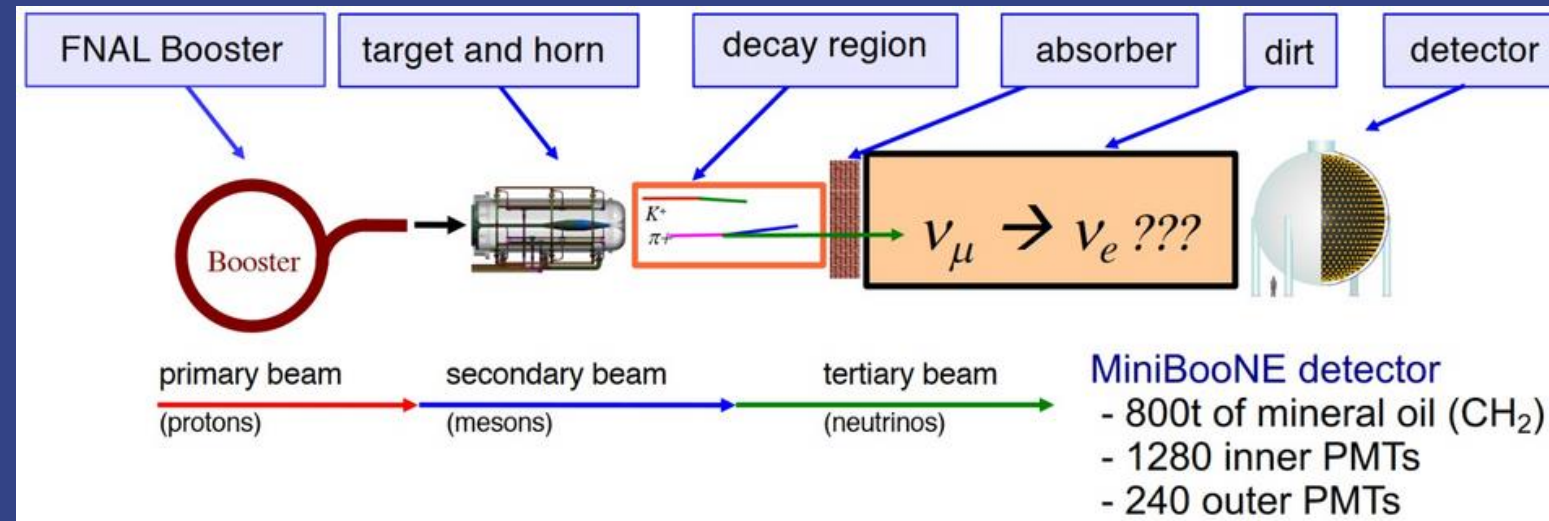# MiniBOONE Experiment Classification Analysis

Group Members:
Allen Wu
Benita Diop

```
# Get the number of elecrons and muons in the file
num_electron, num_muon = mb.get_num_neutrinos(Path("data/MiniBooNE_PID.txt

Number of electrons: 36,499
Number of muons: 93,565
```
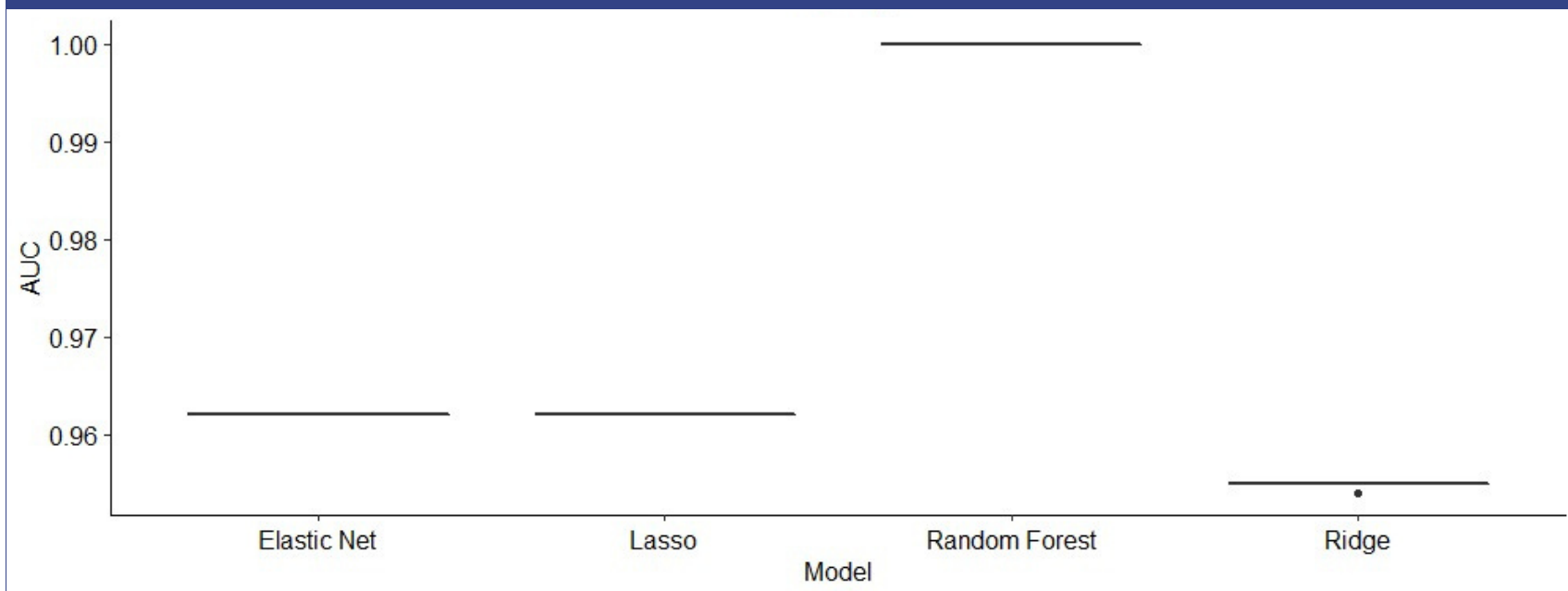
Electrons = 1
Muons = 0

FNAL Booster | target and horn | decay region | absorber | dirt | detector

$\nu_\mu \rightarrow \nu_e$???

primary beam (protons)   secondary beam (mesons)   tertiary beam (neutrinos)

MiniBooNE detector
- 800t of mineral oil (CH$_2$)
- 1280 inner PMTs
- 240 outer PMTs

High Energy Proton   Carbon or Beryllium Nuclei   Neutrino   Pion   Muon

BOX PLOT AUC
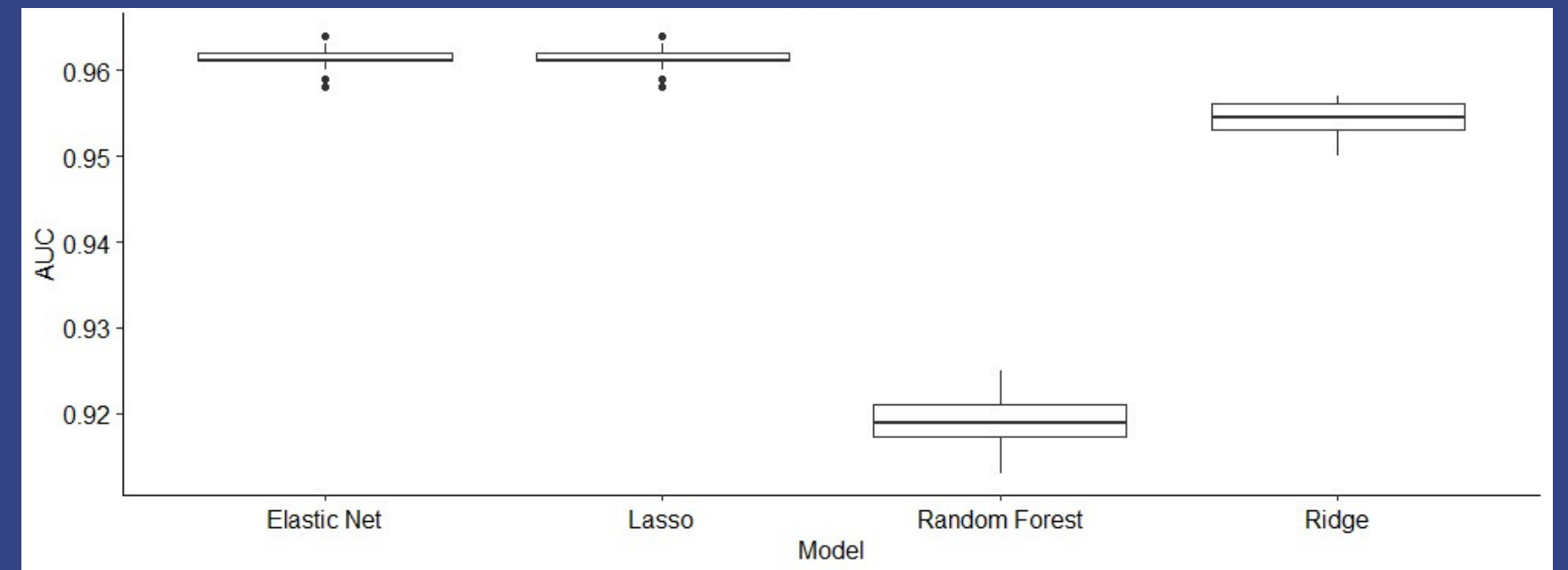
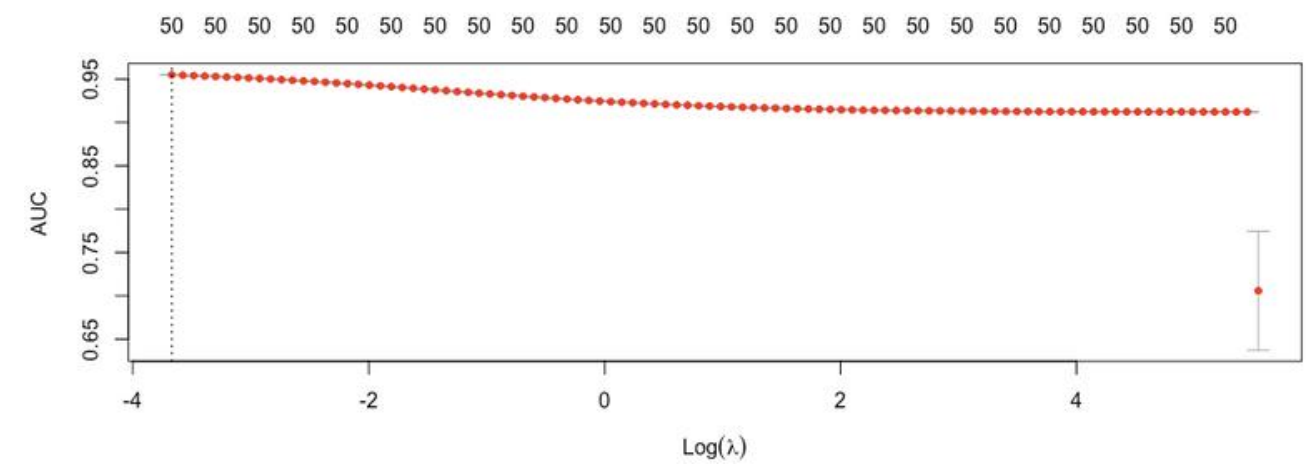| MODEL DIAGONOSTICS	TIME (mins)	AUC	90% C.I. TEST AUC
LASSO	3.0	0.96	0.958 - 0.963
RIDGE	2.3	0.95	0.951 - 0.957
ELASTIC NET	3.2	0.96	0.958 - 0.963
RANDOM FOREST	5.2	0.92	0.916 - 0.925

10-FOLD CV CURVES

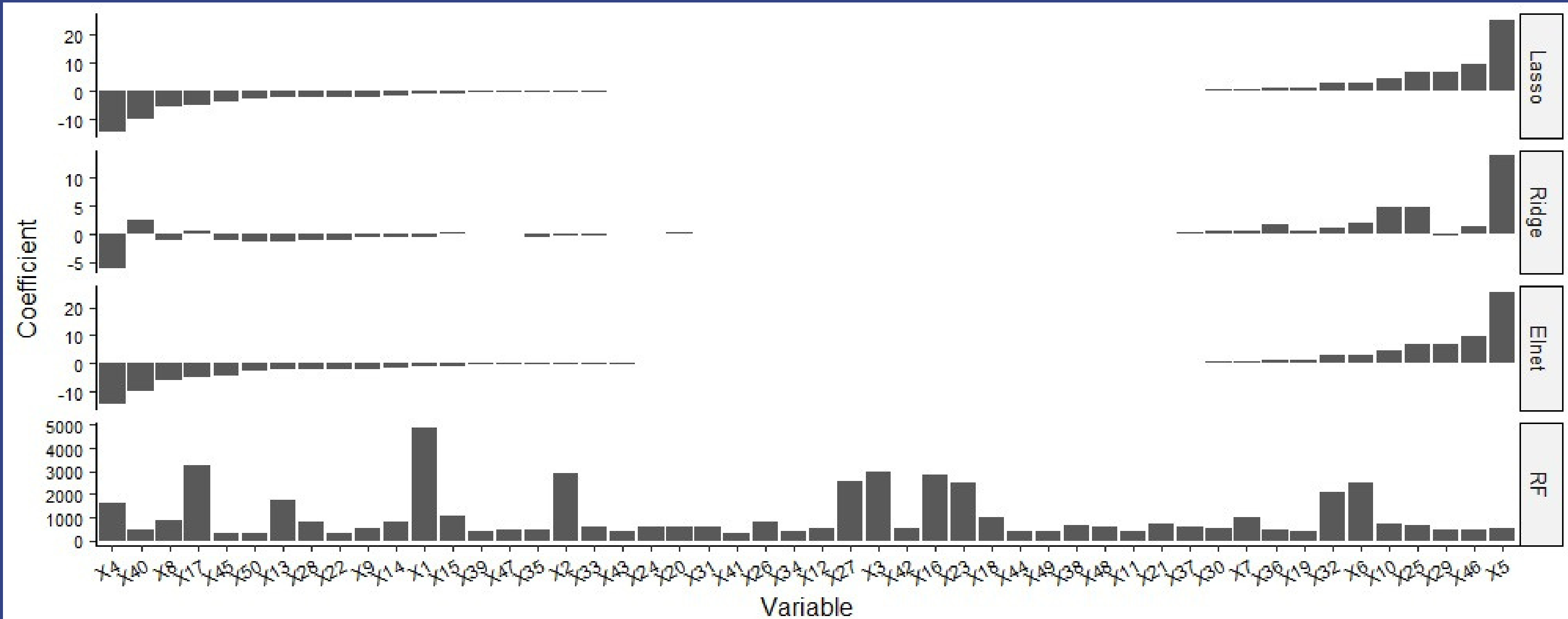## LASSO 3.0 MINS
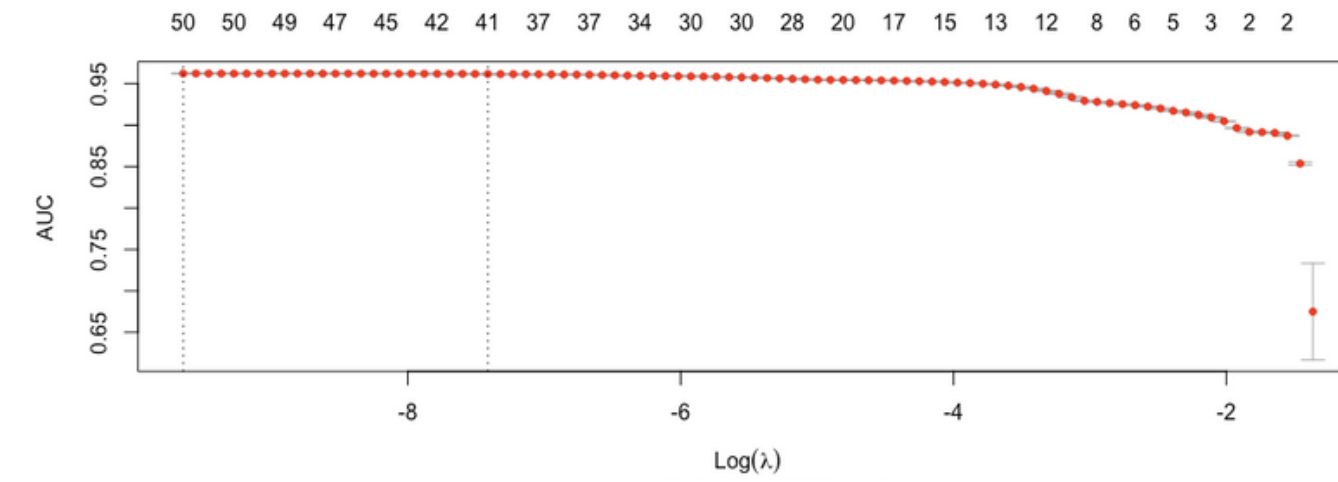
ELASTIC NET 3.2 MINS
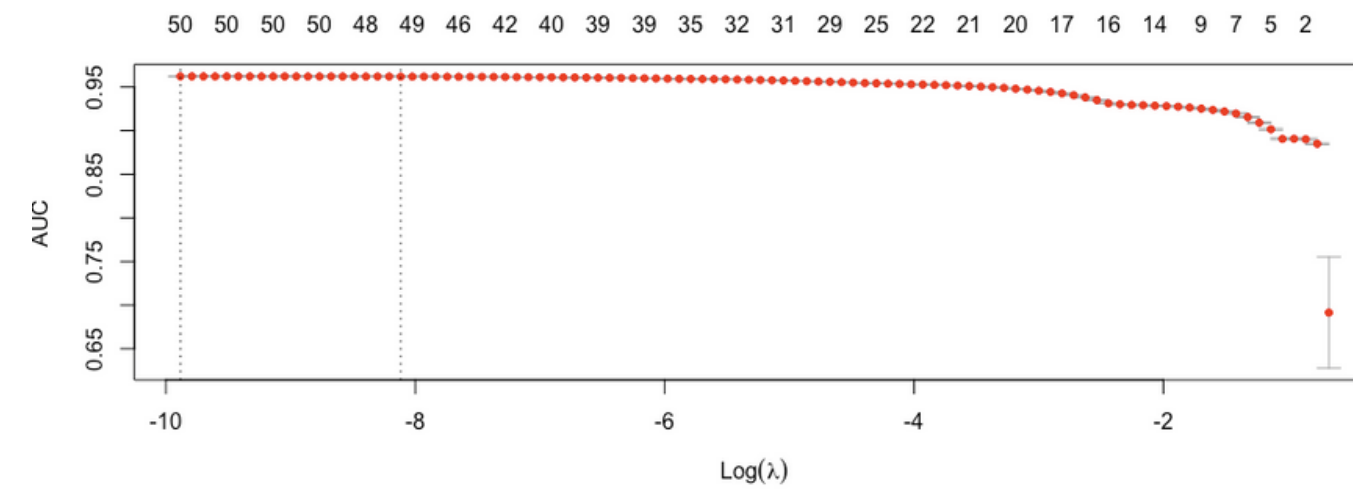
RIDGE 2.3 MINS

BAR-PLOTS OF THE ESTIMATED COEFFICIENTS

Conclusion!

Learn More @
https://bit.ly/9891_Group_11